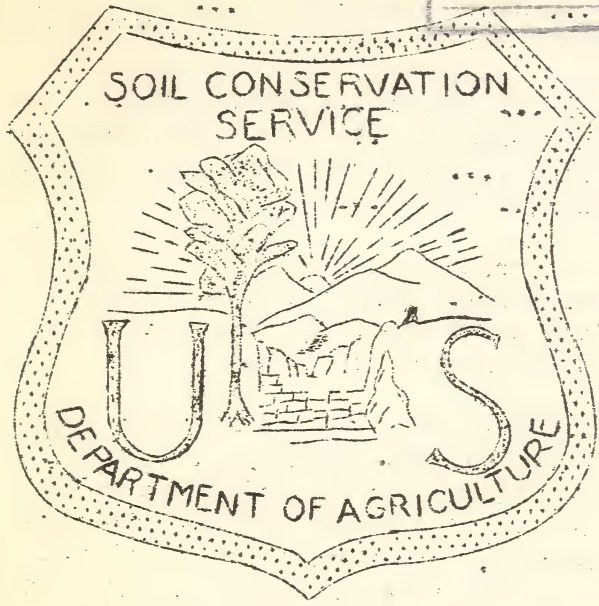


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U. S. Department of Agriculture



COLORADO CONSERVANCY

JANUARY 1936

A YEAR OF EROSION

1935 ... Dust and Floods ... Colorado's masked cities ... Lamar ... Springfield ... Las Animas ... Dust pneumonia ... Smothering cattle ... Sand Buried farms ... Dunes and desert ...

Memorial Day ... Floods ... Lives lost ... Homes swept away ... Highways out ... Farm lands sand covered ... Dams broken ... Colorado Springs ... Elbert ... Kiowa ... Granada ... Holly ...

Thus were the erosion events headlined across the nations' newspapers. Sensational no doubt, but to those who lived under the black clouds of dust and flood, it is altogether too true.

Behind the news value of such happenings are other factors which will for generations to come, appear, not as headlines, but as stubborn problems which will affect the livelihood of those who farm the soils of Colorado. Surveys show that millions of tons of our top-soil have been lost to wind and water. Top-soil that is irretrievable and irreplaceable. Colorado top-soil, without which Colorado Agriculture can not profit. The loss of this top-soil from under our very feet can not be evaluated in dollars, for the production of but a single inch of top-soil requires centuries of Nature's work.

1935 was emphatically Erosion's year. The tribute exacted from our basic resource, our top-soil, shall cripple productiveness of affected Colorado lands for many years. What shall we donate to 1936? How much more of our resources can we dedicate to wind and water?

The Editor

VOL. 2

JANUARY

NO. 1

Published Monthly by Soil Conservation Service
Colorado Springs, Colorado

A. E. McClymonds

Editor--J. S. Young State Co-ordinator

Contributors--Soil Conservation Staff.

SO SAYS THE STATE CO-ORDINATOR

We are soon going to be faced with both wind and water erosion. Wind erosion can be stopped to a considerable extent if every man will list all of his clean-cultivated land as deeply as possible before the heavy winds start.

Bean fields are especial menaces. Let's make a real effort to get all of the fields listed on the contour. The Soil Conservation Service is making every effort to help out on this problem.

Erosion may be likened to a sickness, just starting, it is easily checked, but after it gets well under way, it is much more difficult and costly to check. During its early stages it is likely to be ignored, but during its later stages the individual farmer cannot cope with it and it requires public help to bring it under control.

One reason for present day erosion conditions is that the farmer has always been under economic pressure to produce the maximum crops on his land and in so doing he has cultivated land of a steep nature that never should have been cultivated. Farm prices have nearly always been comparatively low, and when they are high,

self-preservation tends to make the farmer want to reap all he can from his land. The result is that the roll call of ruined areas increases, slowly at first and rapidly later.

We must then face this menace, study the best methods to handle it, and curb its effects. The control of erosion can be accomplished in two ways: First, by the public purchase and repair of land, and second, by the stabilization and restoration of privately owned land while it is occupied and used.

In Colorado both methods will of necessity be used. The lands on which erosion has advanced to such a stage as to be a menace to public interests should be purchased and erosion-control methods put into effect that will get it back to grass as rapidly as possible and assurance given that such land will be left in grass. The larger and more difficult problem of putting into effect erosion-control methods on privately owned land while it is being lived upon and used can be done, and has been done, by a few farmers as well as experimental stations within the western plains areas. It consists of proper cultivation of the soil to save moisture and the planning of the crops in such a manner as to continuously keep a vegetative cover over the land subject to severe wind erosion.

A. E. McClymonds
State Co-ordinator

A true forest is not merely a storehouse full of wood, but, as it were, a factory of wood, and at the same time a reservoir of water. When you help to preserve our forests or to plant new ones, you are acting the part of good citizens.

-----Theodore Roosevelt-----

The Smoky Hill River project is situated in the east-central portion of Colorado. In this area wind erosion has been effective in removing much of the soil. This has been brought about by various conditions which I shall describe briefly.

The soils are for the most part immaturesly developed, containing a considerable amount of salts. This lack of development is due to the lack of and retention of enough rainfall to leach the soluble salts into their respective horizons in the soil profile. It is the nature of these immaturesly developed soils to form a very compact soil due to the lack of structure development.

The soil is also deficient in the amount of organic matter, which acts as a sponge in absorbing the precipitation. This has been removed in the topsoil by wind. All of these conditions have caused a corresponding deficiency in the vegetative cover.

When rain falls with any intensity, the largest percentage runs off of the soil. This is due to the above mentioned conditions, leaving the soil in a loose, powdery condition which is very subject to wind erosion.

The fields which have been under cultivation are the problem areas in the Smoky Hill project. In many instances, from 12 to 20 inches of the soil have been removed, leaving the subsoil exposed. The subsoil for the most part is a loose, powdery lime material which blows very easily when dry. The problem in this area is to bring about such a soil condition that the available moisture will be absorbed and a cover crop can be maintained.

There are many such fields in the Smoky Hill area. In some cases the subsoil has been mixed with the geologic material, which becomes very compact when dry. This makes cultivation practically an impossibility. These conditions are being remedied by proper control methods.

Wallace L. Bruce, Soil Surveyor,
Soil Conservation Service

CONTOUR FURROW PLOW DEVELOPED AT SPRINGFIELD

High praise can be passed the way of the camp superintendents and their attending personnel for their persistence in trying to build equipment that will increase their acreage turnout and lessen the expense burden on construction costs.

This holds without exception in the CCC camps of the Colorado Soil Conservation Service. With limited funds for this work, they have shown an inventive genius that would put Ben Franklin to shame. They all boast junk piles large enough to start an iron foundry, and if you are near Hugo, you are fortunate if you get away with your own suspender buttons and belt buckle.

Out of this turmoil of wits, we finally have a plow constructed that cleans out a neat furrow and leaves a substantial dike as well as a clean 6-inch berm at one whack. In fact, the plow does everything but make the check dams and cook, according to H. G. Beehler, superintendent at Springfield, and his boys who are the proud authors.

With the wide use of this super-intelligent plow, costs can be decreased vastly and miles can be covered where quarter miles have been the rule. This plow is the conglomerate of wide collection of iron and gadgets, plus much patience, many disappointments and several barrels of eloquent profanity, according to Mr. Beehler.

Mr. Beehler describes the implement as being a heavy duty, sod "busting" gang plow, weighing about twenty-six hundred pounds. The furrow is gouged out with a 30-inch stationary disk that has a moldboard attachment which, in turn, has a detachable blade on the lower edge that slopes one side of the ditch. The moldboard moves the soil to the side, forming the dike and a 6-inch berm in the same operation.

A heavy chisel precedes the disk, relieving pressure by breaking the sod in advance. Cooperating with this is a spring hitch attachment that protects the disk in the case of rocks or roots. Parallel and slightly ahead of the disk is a husky chisel attachment which makes a small trench to catch the soil from the moldboard which is to form the dike. This helps tie the newly turned sod to

the virgin soil, hereby reducing risks of leakage. "If the ground is not frozen and is in shape to work", quotes Mr. Beehler, "it is not necessary for the men to do any clean-up work after the plow, other than the construction of check dams. This means we can complete about 12 miles of contour furrow per day at a cost of around \$5.00 per mile."

Into the development of this plow is woven various feats and facts comparable to any pioneering enterprise. Much of the success of the implement, claims Mr. Beehler, goes to the sympathetic farmers who liberally gave oddments of machinery and scrap iron. Ideas, regardless of source, whether from camp boys or foremen, were accepted, sifted and tried out. Through painful evolution, with an old heavy duty Saunders plow as a nucleus, the present creation has been developed.

Time upon time the contrivance was laboriously toted to a distant blacksmith shop to have a flange realigned, a beam strengthened or a heavier disk added. There were times when the foreman or blacksmith employed with its construction, despairingly invited the whole contraption, from stem to rear, to spend the remainder of its days in a region familiarly written about by "Dante". Its extreme perversity and obstinacy was discussed in succulent profanity each time it failed to do the scheduled job, but finally a perfectly tractable machine has resulted.

While the present plow is doing a creditable job, Mr. Beehler and associates are continually hoping to improve it. They hope soon to have four of these plows operating, and by double shifting, aspire to get over 60 miles of contour furrows a day. The ditch is made 9 inches deep, 24 inches wide, while the dike is one foot high.

While the plow as a completed unit is of notable value, the excellent spirit responsible for its construction is exemplary of the intelligent and earnest industry found in the personnel of all soil conservation CCC projects in Colorado.

Today, by our intellect, the power of our brain, we are king of the world. The things of the world today are ours in charge. Today is our time and it is of today that we must think.

But the resources of the world are not ours by vested right, to do with as we wish. The good earth, the clear rivers, the vast forests; these are not ours, however legal our man-made title. These great arteries of all life are Nature's, and Nature's only, and to us they have been but temporarily loaned--a reward for our supremacy.

This loan imposes an obligation on us to guard these temporary possessions to the utmost of our ability, for Nature is a watchful guardian, and a careful custodian of her vast realm. That which we treat well, and accord due care, rewards us with profitable production. That which we abuse pays us back in like coin, and we soon have only devastation before our eyes.

It is now time to review our record. For a hundred and sixty years this land of America has been ours. Have we kept this most important faith? To us in this country Nature has offered us the use of 2 billion acres of land:

A half a billion is mountainous and rough, and is little affected by man's activity. But,

Over a billion has been affected by erosion through but one thing--the influence of man. Of this,

51 million acres have been totally ruined.

A hundred million more has lost most of its productive top-soil.

Let us reflect on the meaning of these few statistics. What is their implication? What do they portend? What, in short, do they mean?

Essentially, they mean that we have been, all of us, so absorbed in our rush, in our many times selfish drive for riches, that we have not heeded the warning that Nature gave us soon after our occupation. They mean that now we see thousands of acres of ruined land--land that

once supported the Nation's finest crops, but now has hardly the life left to support the hardiest weeds. They mean that now we see other thousands of acres, in every part of the country, that even in the best years produce but scanty crops, and in poor years none, because most of the fertile top-soil has been washed or blown away.

They mean that over the Nation each year we see ominous black clouds, dust clouds that carry an all too pointed message—a message of men's failures, of their lost hopes, of ruined farms, of impending poverty. They mean that we see each year floods of muddy water covering our fertile valleys, destroying homes and farms and taking life.

They mean that Nature's warning, given long ago, is now fulfilled. They mean that unless we strive together to check the advancing destruction that has ruined so many millions more, that has brought want, poverty and death to so many people, that is costing us huge sums each year for which we get no return, we will face, before many generations have gone by, the fate of Rome, of Palestine, of China; civilizations struck down in their flower by the destruction of their basic life industry, Agriculture, through the medium of but one agent—Erosion.

Let us think sanely and seriously then, as we view the rolling black clouds and the turbulent muddy water, of these telltale figures. To all of us, conscious now of Erosion's toll, they should point a warning finger we can no longer ignore.

2 billion acres of land are ours to use
 Over a billion have been affected by erosion
 51 million acres have been totally ruined, and
 100 million acres has lost most of its productive
 top-soil.

C. V. Burke,
 Department of Education & Information

CAMP SCS-8-C Wellington, Colorado

This camp is situated in one of the oldest ranching localities of the State. Several Ranchers residing in the immediate vicinity have lived here as long as sixty years, individually. In reminiscing, they reveal that at one time this country was covered with native grasses, springs in the foot hills fed small streams of water running down through the valleys, and that excellent fishing was a perennial privilege. Then, too, wild game abounded.

The Box Elder Creek area extending north and beyond the Wyoming line consists of rugged, bare escarpment, broken up by floods that left alluvial deposits of large rocks and boulders at bottom, and further down as the water runs together, there are found large washes which in some instances are 20 to 30 feet deep and 40 to 50 feet wide, caused by water. Trees have been cut by man, shrubs and grasses have been eaten and trampled into the ground by over-grazing, until, in some instances, all that is left for posterity is an barren and desolate area.

Date of occupation of this Camp was Oct. 15, 1935. Work commenced on Oct. 28, 1935, and was in complete operation by Nov. 10, 1935. A demonstration area has been set up on Section 7 - 10-69 and 11 - 10-70. To date, 40 miles of contour furrows, 200 cubic yards of Masonry drops have been completed. 37 dams and drops have been partly completed. 85 sacks of Native shrub seed have been gathered. 1,140,000 small trees were dug at the Kinghorn Nursery at Fort Collins, Colo., and shipped for transplantation at the Colorado Springs Nursery. An old road is being rebuilt from Camp to the top of a ridge on the West side of the Box Elder Drainage area so that it will be possible, in the Spring, to work at the Head of Box Elder Creek. Plans are being drawn for the mapping of East of Box Elder Creek on the Raw Hide. This area is not rough and more and longer contours can be built.

Cooperation from the Cooperative Ranchers is excellent. Field days will be held as soon as weather permits.

Excellent progress is being made by our educational program and all foremen are instructing classes.

Collectively the Camp moral is high. All enrollees seem to be interested in the work. Cooperation with the Army has been very satisfactory.

Superintendent George L. Mauk,
Camp SCS-8-C, Wellington, Colo.

-----SOIL CONSERVATION SERVICE-----

DUST BOWL SURVEY

An extensive soil and erosion survey is about to be initiated in the "Dust Bowl". The purpose of the survey is to get a picture of conditions in the region relative to wind erosion conditions, and possible remedies. Twenty soil survey parties, consisting of forty experienced soil and erosion surveyors, will work out of field headquarters at Lamar, Colorado, and cover a large block of typical Dust Bowl country, approximating 25,000 square miles. The area to be surveyed lies in Colorado, Kansas, Oklahoma and Texas. The survey will be in charge of Dr. A. H. Jeel, formerly Chief Soil Expert in Colorado, with temporary headquarters at Washington, D. C.

The survey is being conducted under the Division of Conservation Surveys, headed by Mr. Glenn Fuller, Chief of this Division.

-----SOIL CONSERVATION SERVICE-----

"The Federal Land Bank of Houston, Texas lends on the basis of the top six inches of soil representing the farmer's principal capital. If the bank discovers that the farmer is permitting his fields to wash at a rate faster than six inches in thirty-five years, on a thirty-five year loan, foreclosure proceedings ensue,-----

Reprint from the Fishing Creek News

SOIL ORGANIC MATTER

Soil organic matter is produced from the plants grown on the soil; the dead grass, grass roots, tree leaves and needles being the chief contributors.

Soil organic matter and humus formed by the decay of organic matter cause the soil to granulate, resulting in increased pore space and therefore greater water intake and a reduced runoff. It also increases the water holding capacity of the soil, being able to absorb a great number of times its own weight in water.

The percolation losses are reduced; and, necessarily, the removal of plant nutrients present as salts is reduced.

The soil organic matter reduces soil losses on sands that are inclined to blow, reduces excessive evaporation from the surface, and the fibrous material helps to prevent erosion by wind and water.

A soil containing 2% organic matter possesses about 40,000 pounds of dry organic material to the acre-furrow-slice. The organic matter contributes, besides nitrogen, some carbon, hydrogen, oxygen, iron, sulfur, calcium, potassium and other elements taken in by plants.

Under climatic and soil conditions for a given region the organic-matter-forming materials balance decay, and soil organic matter is maintained at a constant quantity. It is a well known fact that when a soil is plowed and cultivated the balance is disturbed as all soil climatic conditions are changed.

A large number of the cultivated soils on our projects have, through mismanagement, lost all the topsoil and consequently the major part of the organic matter.

The topsoil has the greater part of the plant food and available plant food.

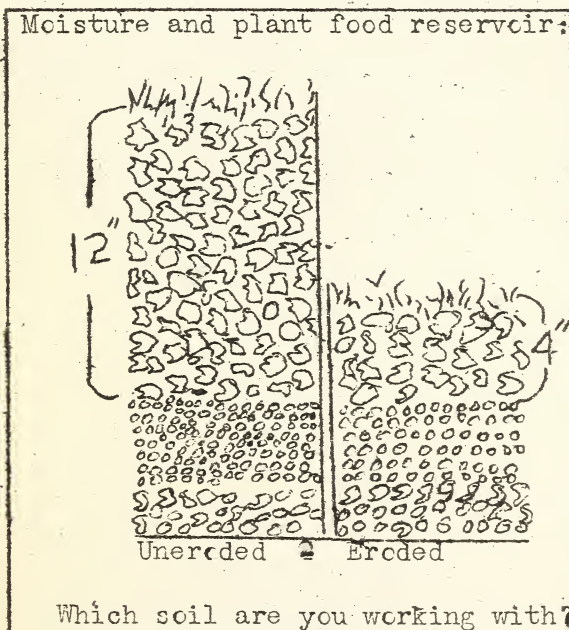
It is inevitable that fields--and we have many of them.

that have, through the ravages of erosion by wind and water, lost just a part of the topsoil produce fewer and more uncertain crop returns. If the loss by erosion on such fields is not controlled, it results in abandonment of that field due to the loss of the soil.

Proper preventative and control methods to prevent erosion losses should be maintained on all farm units.

Richard Covell
Assistant Soil Surveyor

-----SOIL CONSERVATION SERVICE-----



Increasing the grazing value of the ranges in the Colorado conservation region will be difficult, due to the fact that there are a large number of farmers and stockmen who will have to graze their pastures continually with the same amount of stock which they now own. Most of the ranchers are not in a position to obtain relief pasture lands, nor is there enough extra pasture land in the region to afford a complete rest for the now overgrazed pastures in use. Consequently, in order to increase the vegetation and forage value, every available means must be employed to benefit the range lands while they carry the present number of stock.

By contour-furrowing, terracing, and by building check-dams on the slopes and in the gullies, a large part of the run-off water will be conserved. This alone will stimulate increased growth of vegetation. Reseeding the most denuded areas with forage plants will increase the stand as well as the forage value of those areas. The conserving of moisture and the replenishing with seed not produced by the overgrazed plants will no doubt increase the vegetation and offset overgrazing to some extent. In addition to these efforts, a study is being made of the vegetation and the changes that occur in these areas.

The ecology crew, as a part of the Agronomy Division, has as its program the conducting of a range survey and a detailed study of vegetation in selected pastures. These pastures are not selected from the standpoint of forage value, but from the standpoint of the greatest number of vegetative types found growing under the greatest number of conditions. The changes that occur in vegetative types in a region are in definite successive steps, depending on water, light, food supply, temperature, and the competition for those essential substances.

Competition in all grazing lands exists not only between plants, but between plants and animals. In

the latter case, the plant, if palatable, is invariably the loser. However, from a forage value viewpoint this does not always result in a loss. The climax type of vegetation is a region (that is, the highest type which the soil and climate will produce) is often not the most palatable or of the greatest forage value that is capable of being produced in the region. Thus, a controlled amount of grazing is necessary under some conditions to produce the vegetation type having the highest forage value. This condition is not a problem over most of eastern Colorado, but the condition of intense overgrazing is the problem with which we must deal.

In order to make a comprehensive study of the vegetation, it is necessary to study all of the conditions or factors that are or may be present. After the areas are selected, a portion of each is fenced to afford protection from grazing. This allows both protected and unprotected lands of the same types to be studied. These fenced-in portions, since they exclude livestock, are termed "exclosures". Within these exclosures there are small squares staked one meter (about one yard) square in which all species of plants and the number of plants in each species are counted. Then the position of each plant species is located on a map drawn to scale.

The small plots or squares are known as quadrats. From these records it will be possible to learn which plants are advancing and which are receding. We know that in the denuded lands of this region the plant of least value, and the bottom of plant succession, is Russian thistle. This plant is followed in steps in the upward succession by lambsquarter, pigweed, ragweed, wild sunflowers, annual grasses, and then perennial grasses and flowering plants. The taller perennial grasses are the climax type. This succession, as given, is probably the approximate natural one. By staking permanent representative quadrats in protected areas, the rate of plant succession can be determined. The unprotected quadrats will afford information in determining the greatest amount of

grazing which can be allowed without detriment to the production of desirable forage. Also it may be possible to hasten plant succession in the upward trend and retard it in the decadancy.

In addition to range survey and plant succession studies, the ecology crew, in cooperation with the Soils Division, is studying the types of vegetation that occur on the different soil types. This study will determine the plants that should be encouraged and those worth only small or no consideration in each particular area. In cooperation with the Engineering Division, investigations are underway to determine the effect the density of vegetation will have on the amount of water run-off on a given slope.

These studies are an essential part of the Soil Conservation Service program and are necessary to provide information for the development of methods to decrease the run-off and increase the vegetative stand and grazing value of the ranges.

C. W. Frutchey and Wayne W. Ward
Ecological Investigations in Agronomy

NATIONAL WESTERN STOCK SHOW
Denver, Colorado Jan. 18 - 25th

The 1936 show promises to be one of the greatest livestock exhibitions ever offered. The re-establishment of the draft horse class has created added interest in this already successful show.

The Soil Conservation Service will have an exhibit at Booth #39 in the Stadium. This exhibit is being prepared by the Department of Education and Information in conjunction with Mr. G. P. T. Howell of the Regional Office in Albuquerque. Motion pictures of Soil Conservation work in Colorado will be shown evenings at a local hotel in Denver.

CLASSIFIED ADS

For Sale-

My entire farm consisting of 640 acres of Dry Land. Ten acres in cultivation, six hundred and thirty acres in rubber weed, locc, and poverty grass. Good place to raise gullies and unhealthy dust storms. Four large gullies in good growing condition. Any offer considered.

John Rural Citizen

Lost, Strayed or Stolen-

Top soil from my farm; was last seen headed down Horse Creek. Reward for return and no questions asked.

Lincoln County Farmer

Wanted-

Plenty of clear water to swim in. Any help will be appreciated.

A. Trout

Stolen-

Most of top soil from my cultivated land. Wind was seen escaping with same during dust storms of last year. All farmers are warned to take immediate protective measures and be on the alert for the return of this robber.

Baca County Farmer

Wanted-

One thousand acres of land in Eastern Colorado. Must have good stand of grass. Price no object.

A Stockman

Found-

A dam full of silt. Owner may have the same by paying for this ad.

Arkansas Valley Farmer

These ads were adapted from "The South Tyger River News".

Soil is the loose, disintegrated and partially decomposed layer of the earth's crust made up of sands, clays, rocks, and vegetable matter furnishing a medium for plant growth and support.

Soil profile is a vertical section of the soil from the surface into the underlying parent material.

Horizon - Soil horizon is a layer or portion of the soil profile, more or less well defined, and occupying a position approximately parallel to the soil surface.

Horizon A - The upper layer of the soil mass from which material has been removed by percolating waters, -- the surface soil.

Horizon B - The horizon of deposition, to which materials have been added by percolating waters, -- the subsoil.

Horizon C - The horizon of relatively unweathered material underlying the subsoil, or B horizon.

Soil Type - A soil which throughout the full extent of its occurrence has relatively uniform texture of the surface soil and relatively uniform profile characteristics, -- the unit of soil mapping.

Soil Series - A group of soils having the same character of profile (the same general range in color, structure, consistence, and sequence of horizons) - the same general conditions of relief and drainage and usually a common or similar origin and mode of formation. A group of soil types closely similar in all respects except the texture of the surface soils. The series derives its name from the town or stream near which it was first mapped.

Soil Texture - Texture is a term indicating the coarseness or fineness of the soil.

Soil Structure - Structure is a term expressing the arrangement of the individual grains and aggregates that make up the soil mass.

SOIL EROSION MENACE (A Reprint)

"A CONTINUANCE of the manner in which the soil, the mainstay of individual and collective life, is now being squandered, the United States has left to it less than one hundred years of virile national existence. If we are to win out against the accelerated progress of this gangrenous growth of soil erosion, then we have less than twenty years to build up the techniques, to recruit the fighting personnel, and, most difficult of all, to change the attitudes of millions of people who hold that ownership of land carries with it the right to mistreat, and even to destroy their land, regardless of the effect on the total national estate."

These were the words of Morris L. Cooke, consulting engineer, at the annual convention of the American Water Works Association. That such a serious situation exists is perhaps not generally realized.

The Soil Conservation Service of the United States Department of Agriculture and other organizations are making headway with the problem, but unless they are given the whole-hearted support of everyone concerned, their efforts will not be sufficient.

The importance of the drainage structures under and along our roadways and streets in aggravating or preventing erosion is well brought out in one of the articles in this issue. It is infinitely better to prevent this erosion than to try to remedy its effects after it has occurred.

-----The HIGHWAY Magazine-----
December - 1935

UNITED STATES

DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

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